



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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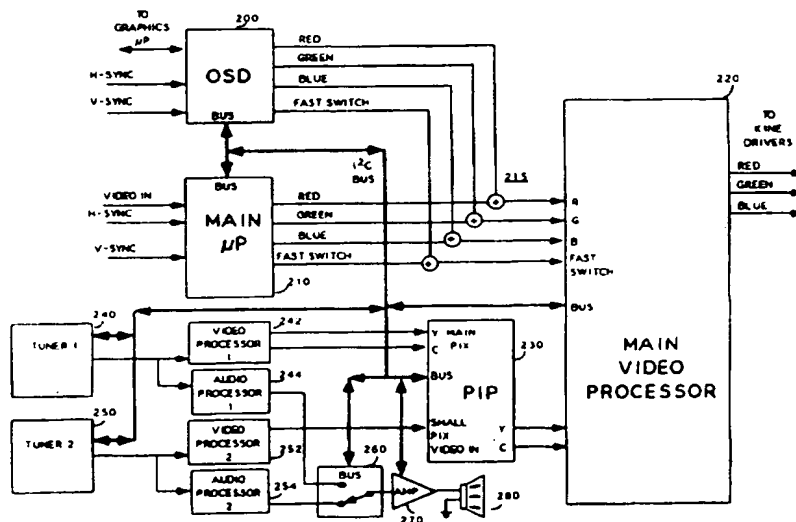
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US

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(54) Title: USE OF AN AUDIO PROCESSING CHANNEL IN A TELEVISION RECEIVER DURING A MULTIPICTURE MODE OF OPERATION



## (57) Abstract

A television receiver comprises a graphics generator (200), a video processor (242; 252), an audio processor (244; 254), a picture-in-picture processor (230), and a controller (210) for producing a display of an array (100) of inset images. The controller (210) causes one inset image of the array (100) of inset images to be displayed with an associated graphics image to indicate selection of the one inset image, and causes the reproduction of the audio signal associated with said selected inset image. In one embodiment, all images except the selected one are "frozen", and the selected image is updated in near real time. In another embodiment, a second tuner (250) is tuned to the selected-image channel and is used to provide audio for the selected image, while the first tuner (240) continues to sequentially tune the channels from which all of the images are derived.

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## USE OF AN AUDIO PROCESSING CHANNEL IN A TELEVISION RECEIVER DURING A MULTIPICTURE MODE OF OPERATION

5           The subject invention generally concerns "multipix" displays for electronics equipment, such as, television receivers, and specifically relates to a novel use for the audio channel during such a multipix display.

          Multipix displays comprising an array of inset images  
10 are well-known in the television art. For example, a television receiver having multiplex capability is the RCA CTC-172, manufactured by Thomson Consumer Electronics, Inc., Indianapolis, Indiana. A viewer can call up such a multipix display and can see samples of television programs from a  
15 number (usually 12) of channels, simultaneously. The CTC-172 also has the capability of highlighting a particular inset image to indicate its selection by a user, and then leaving the multipix mode to tune the selected channel. In such multipix receivers, the tuner is repeatedly and sequentially tuned to each of the source  
20 channels in order to update each of the inset images. In a perfect world this updating procedure would occur so quickly that the user would be totally unaware that he was viewing samples of each channel. Unfortunately, tuning to each channel and obtaining the video signal sample takes an amount of time which is readily  
25 observable to the user. That is, it may take several seconds before the tuner gets around to updating a particular image of an array of twelve inset images. One may also like to hear the sound associated with the selected channel, but due to the relatively slow update speed, this was heretofore impossible.

30           A television receiver comprises a graphics generator, a video processor, an audio processor, a picture-in-picture processor, and a controller for producing a display of an array of inset images. The controller causes one inset image of the array of inset images to be displayed with an associated graphics image to  
35 indicate selection of the one inset image, and causes the reproduction of the audio signal associated with said selected inset

image. In one embodiment, all images except the selected one are "frozen", and the selected image is updated in near real time. In another embodiment, a second tuner is tuned to the selected-image channel and is used to provide audio for the selected image, while the first tuner continues to sequentially tune the channels from which all of the images are derived.

FIGURE 1 shows a screen display comprising a multipicture display.

FIGURE 2 shows, in block diagram form, the relevant portion of the circuitry of a television receiver operating in accordance with the invention.

FIGURE 3 is a simplified drawing of a remote control unit suitable for use with the invention.

Referring to FIGURE 1, a twelve picture multipix array is displayed on a screen 100 of a television receiver. A graphical highlight is shown forming a border around the inset image bearing the channel number 29. The graphical border can be moved from inset to inset by means of cursor keys of a remote control unit 300 of FIGURE 3. During the time that the inset array is displayed, CHAN UP, CHAN DN, VOL UP, and VOL DN keys 303, 304, 305, and 306 are no longer used to change channels or for volume control, but rather are used as X and Y-direction cursor control keys for use by the viewer to "navigate" through the array.

A user operates cursor keys 303-306 to highlight an inset image, and then presses MENU key 301 to accomplish the selection of that particular inset image for tuning. In accordance with the subject invention, highlighting an inset image also causes the reproduction of the audio associated with the channel from which that inset was derived. There are two applications for this concept. In the first, the tuner is commanded to stop sequentially tuning channels for video sample updating, and to tune instead to the channel associated with the selected inset image. All other channel samples are "frozen", by virtue of the fact that they are not being updated, but the selected inset can be updated at a much faster rate, near real time. The audio can be used from the

tuner because it is continuously tuned to the same channel in this mode of operation. It is probable that something of interest on the selected inset caught the viewers eye, and caused him to make that particular selection. The result is that the viewer can see a frozen snapshot of what is on all channels and can focus his attention on the near real time updated video and continuous audio of the selected inset image.

In the second application, a two tuner television receiver uses one tuner for repeatedly and sequentially updating the array of inset images, and uses the second tuner to tune continuously to the selected channel from which the selected inset image is derived. The result in this case is that the viewer can see a continual updates of what is on all channels, but can nevertheless focus his attention on the video and audio of the selected inset image.

FIGURE 2 shows a simplified block diagram of that section of the receiver which provides the above-described screen display and audio capability. OSD (On Screen Display) Processor 200 is preferably a bit-mapped graphics generator for creating the graphics borders around the highlighted inset images, under control of a Main Microprocessor 210. OSD Processor 200 produces image signals at Red, Green, and Blue color signal output terminals. Main Microprocessor 210 also receives a video signal from the television chassis and derives closed caption information therefrom. It produces closed caption display signals at Red, Green, and Blue color signal output terminals. The outputs of OSD Processor 200 and of Main Microprocessor 210 are summed together in an array of summing circuits, generally designated 215. These summing circuits may comprise, for example, the well-known non-additive mixer circuit, which has the property that it will pass the greater of the two signals at its inputs while blocking the lesser of the two input signals. The outputs of the summing circuits are applied to a MAIN VIDEO PROCESSOR unit 220 which also receives Y (luminance) and C (chrominance) component video signals from a PIP unit 230. The input signals for PIP unit 230 are provided by a first tuner 240, a first video

processor 242, a second tuner 250, and a second video processor 252. A fast switch signal generated by either OSD Processor 200 or Main Microprocessor 210 causes the graphics signal (or closed caption signal ) to be substituted for the video signal for the  
5 duration of the fast switching signal. Tuner 240 and tuner 250 also provide signals to a pair of audio processors 244 and 254. Audio processors 244 and 254 provide signals to an audio switching arrangement 260 operating under control of main microprocessor 210. The selected audio signal is applied to an  
10 audio amplifier 270 and to a speaker 280 (the audio channel is shown monophonic for simplicity, but stereophonic is not precluded.)

A one tuner embodiment would include all elements of FIGURE 2 except tuner 240, video processor 242, audio processor  
15 244, and audio switch 260. In operation of the one tuner embodiment, Main Microprocessor (i.e., system controller) 210 operating under control of its own software causes PIP unit 230 to automatically display a graphics border drawn by OSD processor 200 around the exact location of the PIP inset corresponding to  
20 the user's selection, and controls tuner 250 to stop sequentially tuning, and to tune continuously to the channel from which the selected inset image is derived. When tuner 250 has completed tuning that channel, the output of audio processor 254 is applied to amplifier 270 for audio reproduction in speaker 280. Audio  
25 amplifier is also controllable to turn on and off by main microprocessor 210 via the internal bus.

In operation of the two tuner embodiment, Main Microprocessor (i.e., system controller) 210 operating under control of its own software causes PIP unit 230 to automatically  
30 display a graphics border drawn by OSD processor 200 around the exact location of the PIP inset corresponding to the user's selection, and controls tuner 240 to tune to the channel from which the selected inset image is derived. When tuner 240 has completed tuning that channel, audio switch 260 is caused to  
35 select the output of audio processor 244 and apply it to amplifier 270 for audio reproduction in speaker 280. Audio amplifier is

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also controllable to turn on and off by main microprocessor 210 via the internal bus. As a further advantage, it is noted that faster tuning of the selected channel can be accomplished because the second tuner is already tuned to the selected channel.

5           The phrases "system controller" and main microprocessor are used interchangeably herein and are intended to also encompass microcomputers and dedicated custom integrated circuits. The term "television receiver" is intended to encompass television receivers having a display device  
10 (commonly called TV sets) and television receivers not having a display device (such as VCRs).

## CLAIMS

1. Apparatus for use in a television system, apparatus  
5 comprising:  
    graphics generation means (200) for generating a  
    graphics signal for display;  
    video processing means (242;220) for processing a  
    video signal;  
10      audio processing means (244;270) for processing an  
    audio signal;  
    picture-in-picture processing means (230) coupled to  
    said video processing means (242;220) and deriving a signal from  
    said video signal for producing an inset image;  
15      said video processing means (242;220) producing a  
    combined signal which when displayed comprises a video image  
    of an array of inset images (100); and  
    control means (210) for controlling said video  
    processing means (242;220), said graphics generation means (200)  
20 and said picture-in-picture processing means(230);  
    said control means (210) causing one inset image of  
    said array of inset images to be displayed and causing said audio  
    processing means to reproduce an audio signal associated with  
    said selected inset image.



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2. The television apparatus of claim 1 further comprising a tuner (240) for tuning television channels in a repeating sequence for providing recurring samples of video signals at different television channels;

5           said audio processing means (244;270) processes audio signals received from said tuner;

          said video processing means (242;220) processing a first video signal received from said tuner (240) and a second video signal received from said picture-in-picture processing  
10 means (230) for producing said combined signal;

          said array of inset images (100) are sampled from said different television channels; and

          said control means (210) controlling said tuner (240) and causing one inset image of said array of inset images to be  
15 displayed with a graphics image to indicate selection of said one inset image, and causing said tuner (240) to tune to the channel of said selected inset image and controlling said audio processor to reproduce an audio signal associated with said selected inset  
image.

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3. The television apparatus of claim 1 further comprising:

- a first tuner (240) for tuning television channels; and
- a second tuner (250) for tuning television channels in
- 5 a repeating sequence for providing recurring samples of video signals at different television channels; and wherein
- said audio processing means (244;254;260;270) processes audio signals received from said first tuner;
- said video processing means comprises a first video
- 10 processor (242) for processing a video signal received from said first tuner (240) and a second video processor (252) for processing a video signal received from said second tuner (250) and a third video processor (220) coupled to said picture-in-
- picture processing means (230) for producing said combined
- 15 signal;
- said array of inset images (100) are sampled from said different television channels; and
- said control means (210) controlling said first (240) and second (250) tuners;
- 20 said control means (210) causing one inset image of said array of inset images to be displayed with a graphics image to indicate selection of said one inset image, and causing said first tuner to tune to the channel of said selected inset image and controlling said audio processor to reproduce an audio signal
- 25 associated with said selected inset image.

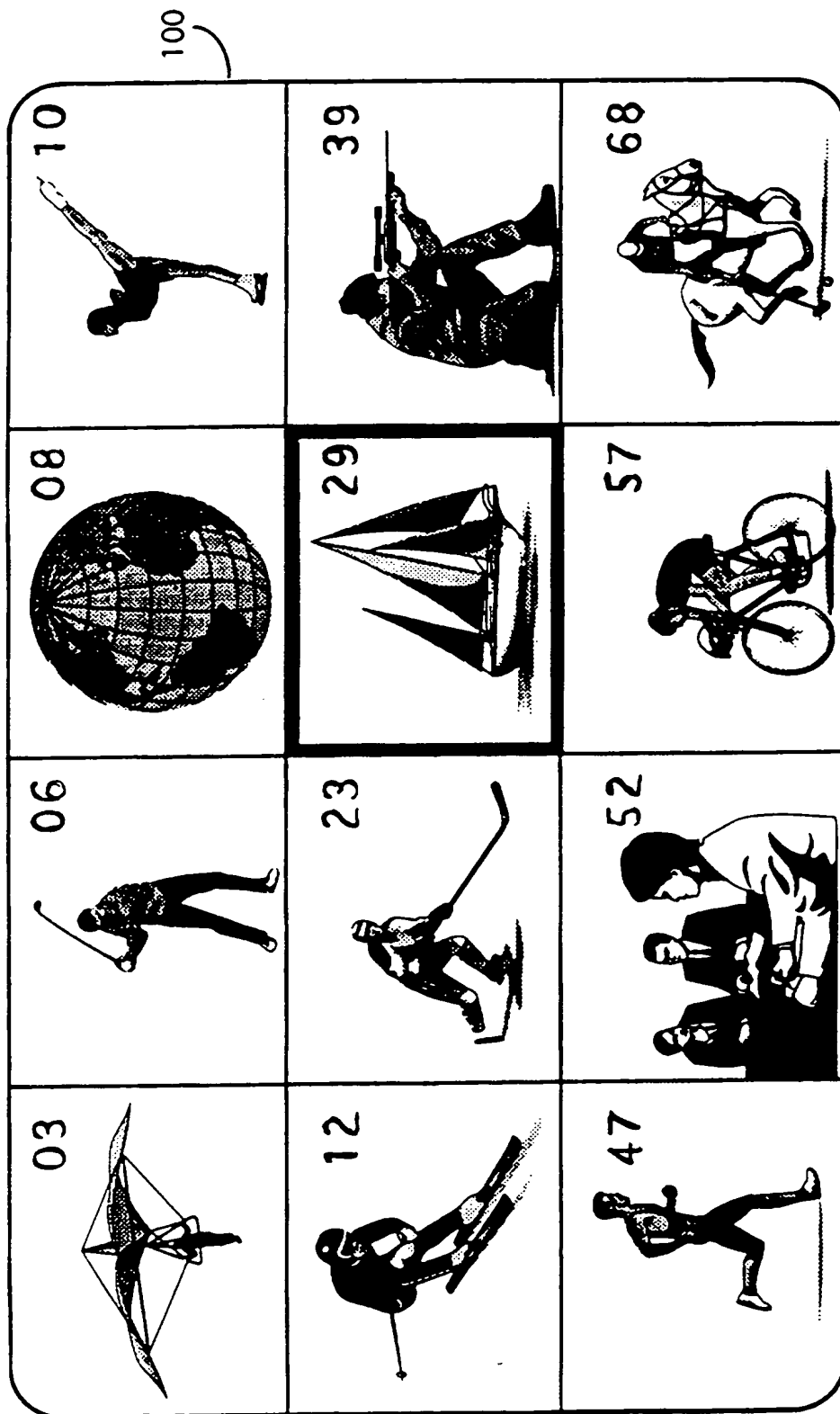
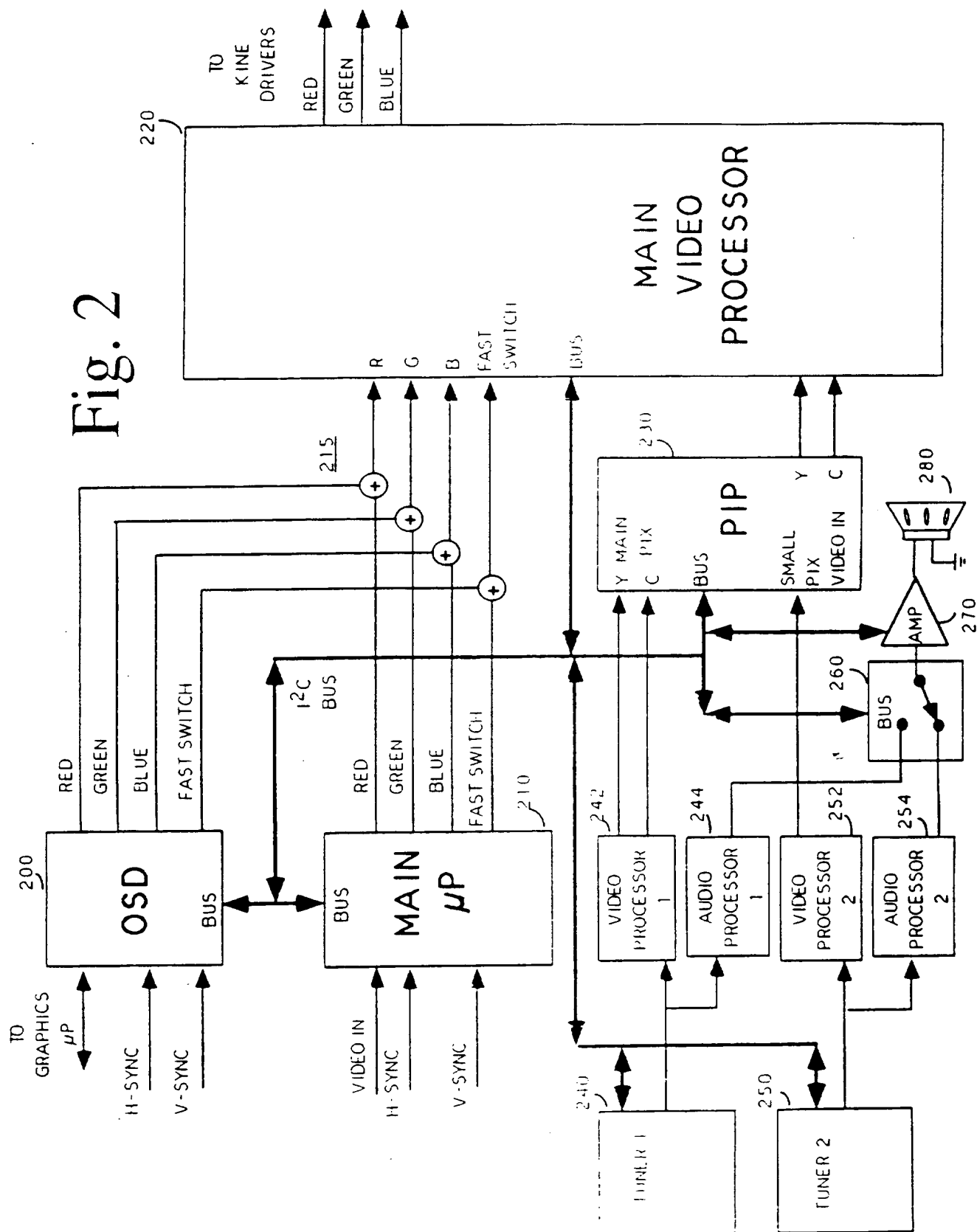


Fig. 1

Fig. 2



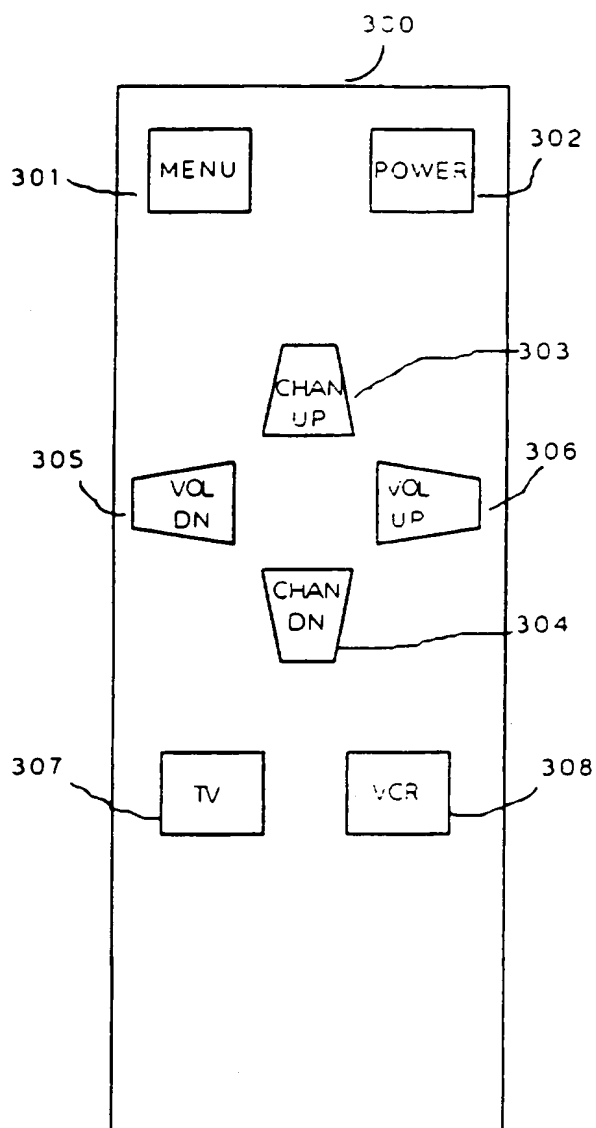


Fig. 3

# INTERNATIONAL SEARCH REPORT

Int. Application No.  
PCT/US 95/13646

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 H04N5/45

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 13 no. 374 (E-808) ,18 August 1989 & JP,A,01 126083 (SANYO ELECTRIC CO LTD) 18 May 1989, see abstract ---	1-3
Y	EP,A,0 617 556 (SONY EUROPA GMBH) 28 September 1994 see column 10, line 37 - column 11, line 40 see column 15, line 53 - column 20, line 11 see column 32, line 55 - column 33, line 10 ---	1-3
Y	US,A,4 903 129 (BELL I. ET AL) 20 February 1990 see the whole document --- -/--	1-3

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

1 March 1996

Date of mailing of the international search report

06.03.96

Name and mailing address of the ISA

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# INTERNATIONAL SEARCH REPORT

International Application No.  
PCT/US 95/13646

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
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A	EP,A,0 486 987 (TECNOENERGIA BY TEL S.R.L.) 27 May 1992 see the whole document ---	1-3
A	EP,A,0 557 033 (SONY CORPORATION) 25 August 1993 see the whole document ---	1-3
A	GB,A,2 220 543 (SAMSUNG ELECTRONICS CO. LTD) 10 January 1990 see the whole document ---	1-3
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Information on patent family members

International Application No.

PCT/US 95/13646

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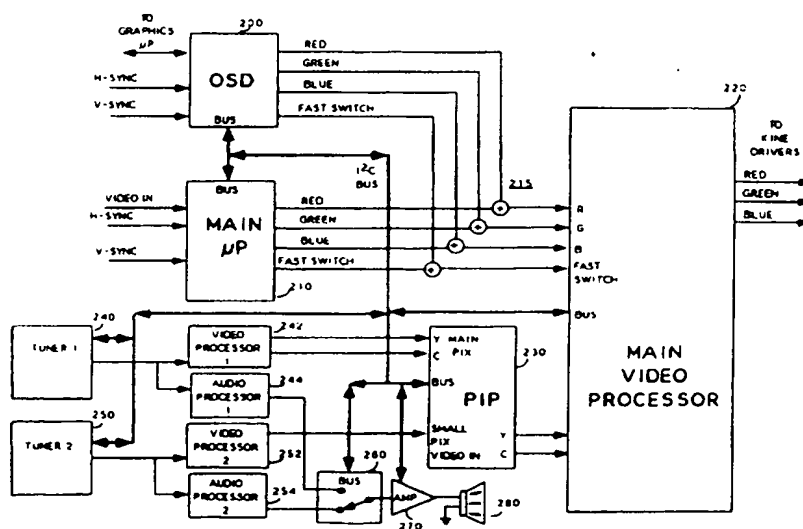




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(51) International Patent Classification <sup>6</sup> : H04N 5/45	A1	(11) International Publication Number: WO 96/13120 (43) International Publication Date: 2 May 1996 (02.05.96)
(21) International Application Number: PCT/US95/13646 (22) International Filing Date: 5 October 1995 (05.10.95) (30) Priority Data: 328,674 25 October 1994 (25.10.94) US (71) Applicant: THOMSON CONSUMER ELECTRONICS, INC. [US/US]; 10330 North Meridian Street, Indianapolis, IN 46290-1024 (US). (72) Inventor: SHAFER, Kirk, Edward; 5195 Clear Lake Court, Camel, IN 46033 (US). (74) Agents: TRIPOLI, Joseph, S. et al.; GE & RCA Licensing Management Operation, Inc., CN 5312, Two Independence Way, Princeton, NJ 08540 (US).		(81) Designated States: CN, JP, KR, MX, SG, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  Published With international search report. With amended claims and statement.  Date of publication of the amended claims and statement: 13 June 1996 (13.06.96)

(54) Title: USE OF AN AUDIO PROCESSING CHANNEL IN A TELEVISION RECEIVER DURING A MULTIPICTURE MODE OF OPERATION



## (57) Abstract

A television receiver comprises a graphics generator (200), a video processor (242; 252), an audio processor (244; 254), a picture-in-picture processor (230), and a controller (210) for producing a display of an array (100) of inset images. The controller (210) causes one inset image of the array (100) of inset images to be displayed with an associated graphics image to indicate selection of the one inset image, and causes the reproduction of the audio signal associated with said selected inset image. In one embodiment, all images except the selected one are "frozen", and the selected image is updated in near real time. In another embodiment, a second tuner (250) is tuned to the selected-image channel and is used to provide audio for the selected image, while the first tuner (240) continues to sequentially tune the channels from which all of the images are derived.

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FR	France			VN	Viet Nam
GA	Gabon				

## AMENDED CLAIMS

[received by the International Bureau on 6 May 1996 (06.05.96);  
original claims 1-3 cancelled; new claims 4-8 added (2 pages)]

4. A television receiver, comprising:  
only one tuner for tuning television channels in a  
repeating sequence for providing recurring samples of video  
5 signals at different television channels;  
an audio processor for processing audio signals  
received from said tuner;  
a video processor for processing a video signal  
received from said tuner;  
10 picture-in-picture processor coupled to said video  
processor and deriving a signal from said video signal for  
producing an inset image;  
a second video processor coupled to said picture-in-  
picture processor for producing a combined signal which when  
15 displayed comprises a video image of an array of inset images  
sampled from said different television channels; and  
control means for controlling said tuner, said second  
video processor, and said picture-in-picture processor to produce  
said combined image;  
20 said control means selecting one inset image of said  
array of inset images in response to an input of a user causing  
said tuner to cease updating samples of nonselected inset images,  
and to tune to the channel of said selected inset image and  
controlling said audio processor to reproduce an audio signal  
25 associated with said selected inset image while continuing to  
display said nonselected inset images along with said selected  
inset image.
5. The television receiver of claim 4, comprising:  
30 graphics generation means for generating a signal for  
display, said signal being indicative of the selection of said  
selected inset image of said array of inset images.

AMENDED SHEET (ARTICLE 19)

6. The television receiver of claim 5,  
further comprising

data entry means for use by said user for entering  
5 said data to specify a screen location at which said graphics  
generation means causes said signal indicative signal to be  
displayed.

7. The television receiver of claim 6, wherein said  
10 data entry means is keyboard of a remote control unit, and said  
location data is cursor direction data and channel up, channel  
down, volume up and volume down keys of said data entry means

8. The television receiver of claim 7,  
15 wherein said nonselected inset images are displayed in a frozen in  
time mode, and said selected inset image is displayed in near real  
time.

AMENDED SHEET (ARTICLE 19)

## STATEMENT UNDER ARTICLE 19

As a result of the outstanding Search Report, claims 1-3 have been cancelled. Claims 4-8 are newly added and are presented for consideration. Applicant submits that no new matter has been added when preparing new claims 4-8.

Argument over Newly Discovered Category X Prior Art:

In view of , Patent Abstracts of Japan vol. 13 no. 374, 18 Aug. 1989, and JP 01 126083 (Takao), assigned to Sanyo Electric Co. Ltd. claims 1-3 of the subject patent, concerning a two tuner embodiment of the invention, have been cancelled. However, Applicant points out that there is absolutely no teaching, nor even a mere suggestion, in Takao concerning how to implement an audio function while performing a multipicture display in a television receiver having only a single tuner. Claim 4 and its associated dependent claims 5-8 are drawn to such a single tuner implementation. For that reason, Applicant submits that claims 4-8 are patentable over Takao.

Argument over Newly Discovered Category Y Prior Art:

The Examiner cites two references as Category Y, EPO 0 617 556 A1 (Buchner), assigned to Sony Europa GmbH, and US 4,903,129 (Bell et al.) assigned to Thomson Consumer Electronics, Inc.

Bell does not concern a multipicture display at all. Bell teaches an apparatus for performing an audio signal swap when a video signal swap is performed, in order that the proper audio be produced with the "big picture". There is absolutely no teaching, nor even a mere suggestion, in Bell concerning how to implement an audio function while performing a multipicture display in a television receiver having only a single tuner.

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